

VI. THE PROTECTION OF RADIO ASTRONOMY OBSERVATIONS IN THE SHIELDED ZONE OF THE MOON

Future radio astronomy observations made from telescopes in the shielded zone of the moon will need to be protected. The reasons for this are discussed in CCIR Recommendation 479-1, "Protection of Frequencies for Radioastronomical Measurements in the Shielded Zone of the Moon" (see Appendix). The Committee on Radio Frequencies has been concerned for a number of years with protecting radio astronomy observations in this zone.

Along with discussions of establishing a lunar observatory in the next century (see, for example, *The Decade of Discovery in Astronomy and Astrophysics*, National Academy Press, Washington, D.C., 1991), it is prudent for scientists to prepare for actions that may be needed to protect passive observations. The concept of a Lunar Quiet Zone has been studied and advanced as a valuable international resource for radio astronomers and for other scientists who conduct passive observations of the universe.

APPENDIX

Protection of Frequencies for Radioastronomical Measurements in the Shielded Zone of the Moon

CCIR Recommendation 479-1 (International Telecommunication Union, Geneva)

"The CCIR,

CONSIDERING

"(a) that some radioastronomical and other scientific experiments are difficult, and in certain cases impossible, to carry out on the surface of the Earth because of tropospheric and ionospheric absorption, scintillation, and radio interference;

"(b) that radioastronomical discoveries resulting from limited observations from spacecraft above the atmosphere of the Earth reveal unexpected new astronomical phenomena;

"(c) that further developments will enable experiments to be carried out in the relatively quiet environment in the shielded zone of the Moon;

"(d) that, in addition to the establishment of line-of-sight communication links for scientific and other purposes between the Earth and spacecraft, it may be necessary to establish links between stations on the far side of the Moon and other stations on or visible from the Earth;

"(e) that the shielded zone of the Moon is free from terrestrial radiation at all radio frequencies;

"(f) that Recommendation No. Spa 2-8 of the Radio Regulations expresses the desirability of maintaining the shielded area of the Moon as an area of maximum value for observations by the Radioastronomy Service and by passive space research and consequently as free as possible from transmissions;

"(g) that the same Recommendation also invited the CCIR to study the frequency bands most suitable for radioastronomy observations on the shielded area of the Moon and work out Recommendations concerning these bands as well as criteria for their application and protection;

"(h) that Earth satellites with high apogees, deep-space probes and transmitters located on the Moon may each illuminate the shielded zone;

"(i) that Report 539-1 contains preliminary guidelines on the use of the frequency spectrum in the shielded zone of the Moon,

"UNANIMOUSLY RECOMMENDS

- "1. that in planning the use of the radio spectrum, both nationally and internationally, account be taken of the need to provide for radioastronomy observations in the shielded zone of the Moon;
 - "2. that, in taking account of such a need, special attention should be given to those frequency bands in which observations are difficult or impossible from the surface of the Earth;
 - "3. that the frequency spectrum should be used in the shielded zone of the Moon in keeping with the preliminary guidelines contained in Report 539-1.
 - "4. that in the frequency bands which would be considered for joint use by active and passive space stations in the shielded zone of the Moon, radioastronomy observations should be protected from harmful interference. To this end appropriate discussions between concerned administrations may be conducted."
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To: Robert Riemer @ NAS
cc: rfisher at BITNET@CCMNRC
From: rfisher@sadira.gb.nrao.edu (RICK FISHER) at BITNET@CCMNRC
Date: 06/13/94 10:18:00 AM
Subject: Re: Final Draft of FCC Reallocation

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Roc,

The final draft of the CORF comments on the reallocation of the 2390-2400 MHz band look OK to me.

Rick

To: Robert Riemer @ NAS
cc:
From: haynes@astrosun.TN.CORNELL.EDU (Martha Haynes) at Internet@CCMNRC
Date: 06/14/94 06:16:00 PM
Subject: Another try at yesterday's message:

Received: by ccmil from darius.nas.edu
From haynes@astrosun.TN.CORNELL.EDU
X-Envelope-From: haynes@astrosun.TN.CORNELL.EDU
Received: from ASTROSUN.TN.CORNELL.EDU by darius.nas.edu with SMTP id AA26912
(5.65c/IDA-1.4.4 for <rriemer@nas.edu>); Tue, 14 Jun 1994 18:16:42 -0400
Received: from veiques.TN.CORNELL.EDU (VIEQUES.TN.CORNELL.EDU) by astrosun.TN.COR
NELL.EDU (4.1/1.1nn-Cornell Astronomy Dept)
id AA15105; Tue, 14 Jun 94 18:16:28 EDT
Date: Tue, 14 Jun 94 18:16:28 EDT
From: haynes@astrosun.TN.CORNELL.EDU (Martha Haynes)
Message-Id: <9406142216.AA15105@astrosun.TN.CORNELL.EDU>
To: rriemer@nas.edu
Subject: Another try at yesterday's message:

%From haynes Mon Jun 13 15:59:09 1994
%To: rriemer@nas.bitnet
%Subject: CORF document

Hi Roc,

I think the CORF document is basically fine. I have only
two minor comments:

(1) A good deal of time is spent saying how important it
is to protect the radio spectrum for passive radio astronomy,
but then out of no-where comes the idea of doing radar which
is not passive. The passive stuff is applicable to the 4.8 GHz
realm, but somewhere the point needs to be made that radar
astronomy transmissions are done in a carefully controlled
manner, with short-term transmissions from earth which are
then sensed as weak radar echoes from the objects reflecting
them.

(2) I think the phrase "to watch for collisions from" should be
changed to something like "monitoring the orbits of ". I hope
we aren't going to watch any collisions!

Otherwise, it all sounds great.

Regards,

Martha

To: Robert Riemer @ NAS, Haynes@astrosun.tn.cornell.edu at BITNET@CCMNRC, rfisher@nrao.edu at BITNET@CCMNRC, swenson@ux1.cso.uiuc.edu at BITNET@CCMNRC, whoward@tecsun1.tec.army.mil at BITNET@CCMNRC
cc: whoward@tecsun1.tec.army.mil at BITNET@CCMNRC
From: whoward@tecsun1.tec.army.mil (Dr. William E. Howard III) at BITNET@CCMNRC
Date: 06/13/94 08:35:00 PM
Subject: Re: Final Draft of FCC Reallocation

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Roc,

Have read the draft you sent and it looks very good. Be sure that the case is made in the continuum band that is science-based and not based on considerations that the cost to convert receivers would be prohibitive. If that case were made, you would find groups that will try to buy new transmitters/receivers just to keep the radio astronomers off their back. You don't want that!!

Good job! - Best from Bill Howard